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ABSTRACT

In March 1968, the Board of Education of School District 65 in Illinois began a study of the effects of school integration upon the pupils, teachers, and parents of the city of Evanston. This interim report is a summary of activities and a research design projection through to the conclusion of the study, June 30, 1971. Analyses are not included, but projected methodology and analysis techniques are fully reported. (Author/DM)

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EVALUATION OF INTEGRATION

OF EVANSTON DISTRICT 65 SCHOOLS

INTERIM REPORT

PR-69-10

Prepared by

Daniel P. Norton

Jayjia Hsia

June 1969

This project is being conducted by Educational Testing Service under contract with Evanston District 65. It is a subcontract to contract RF 68019 between Rockefeller Foundation and District 65, scheduled for completion June 30, 1971.

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A District 65 Aptitude and Achievement Testing Schedule

FOREWORD

In March, 1968, The Board of Education of the Community Consolidated School District No. 65, Cook County, Illinois, contracted with Educational Testing Service to conduct a study of the effects of school integration by redistricting and busing upon the pupils, teachers and parents of the City of Evanston.

This report is a summary of activities completed on behalf of the Evanston Integration Study (subcontract, with Evanston District 65 from the Rockefeller Foundation), as well as a design projection through to conclusion of the study, June 30, 1971. Results of analyses undertaken to date are not included, but a tentative schedule for their transmission is provided.

The activities which have been projected seem presently feasible within the budgetary limitations. Subsequent scheduled reviews of cost factors may lead to future revisions.

BACKGROUND

A position paper on school integration studies[1] concluded that "one good reason that there has been no adequate research on the effect of integration is that there have been no adequate real-life tests--no large scale, long-run instances of ethnic integration in top-quality majority-white schools. . . ." Community Consolidated School District 65, Evanston-Skokie, Illinois, would seem to be a pioneer in its committment to a longitudinal study on the effects of desegregation in a recognized top-quality, majority-white school system.

District 65 schools were desegregated in September, 1967, by combining redrawn school boundaries to limit de facto segregation with the busing of some black pupils from central Evanston to the peripheral all-white schools. At that time the administration committed itself to initiate a long-term study to find out what impact desegregation had upon the pupils, the schools and the community. Support for a proposed three-year study[2] was funded by the Rockefeller Foundation in March, 1968. Subsequently, a contract was drawn with Educational Testing Service, which was to undertake a substantial part of the study in cooperation with District 65 personnel.

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1. Nancy H. St. John, "Minority Group Performance Under Various Conditions of School Ethnic and Economic Integration," IRCD Bulletin 4, May, 1968, p. 2.

2. Gregory C. Coffin, "A Proposal for Evaluation of Integration of Evanston District 65 Schools," January, 1968, 21+ pp.

It is important to distinguish the difference between the meaning of the terms desegregation and integration. Desegregation of a school district means, at best, that physical proximity of black and white pupils has been brought about in balanced ratio. Desegregation can be achieved by administrative fiat, with or without broad based community support.

Integration, on the other hand, goes beyond improving opportunities for unrestricted physical access to equality in education. Integration means the realization of equal educational opportunity and respect for individual differences based on a foundation of community support. Mutual respect, acceptance and cooperation characterize an integrated school community.

The stated goal of the present study is to determine the outcomes of integration in District 65 schools by seeking answers to the following questions:

1. What impact, if any, may desegregation have had upon achievement of white and black students?

2. How may the attitudes of students have been affected by the integration program?

3. How may attitudes of parents, teachers and other interested persons have been affected?

In order to break down these three questions into small enough units so that specific hypotheses can be formulated and tested for each, a series of questions has been phrased within four broad behavioral categories which exert influence upon and which in turn reflect the process of integration: (1) the individual student, (2) his family, (3) his school and (4) community factors.

The Student.

1. What was the status of central tendencies and variability of academic test scores of pupils grouped by race, sex and prior segregated school experience at the beginning of the study? Were any differences between groups significant statistically?

2. Would there be any differences in the direction and magnitude of change in aptitude and achievement test scores among groups on subsequent retests during the three years of the study?

3. Would differences which might arise in outcomes of achievement and aptitude testing be accompanied by changes in the grades earned by pupils before and after desegregation? Would there be subject differences?

4. When prior test results from pupil records are compared to test results of the present study, would differences found in the integration evaluation testing program be confirmed?

5. What was the initial status of pupil self-concept and attitude towards school among the groups studied?

6. How would patterns of self-concept and attitude towards school change over the period of the integration study?

7. Would there be evidence of changing friendship patterns in classrooms as a result of desegration?

The Pupil and His School.

1. How have busing and changing schools affected the attendance and academic performance of the students involved as reflected in school records? Do changes, if they are found, seem to be long-term or transient?

2. Can observed group differences in attendance and academic performance be associated with the pre-desegregation racial composition of their former schools?

3. Some recent studies have indicated that the socio-economic level of a school[3] is related to and may influence pupil performance. Does the Evanston study bear out such influence?

4. How has the attitude of teachers toward integration developed over the period of the study?

5. When classrooms are studied as a unit, what changes are observed in the ability of different races to plan and carry out classroom activities as a cooperative group?

The Pupil and His Family.

1. What relationship has the socioeconomic status of the family to pupil achievement and aptitude as measured by tests, grades and observation?

2. Are black and white parents comparable in their interest in school and educational aspirations for their children? Are they successful to the same degree in translating their interest into overt observable behavior such as attending conferences, PTA meetings? Can their interest be seen reflected in their children's academic performance?

Integration and the Community.

1. Have specific community organizations publicly made known viewpoints on school integration issues?

2. What was the expressed attitude of the black and white communities at the time decision for integration was made, and how have these attitudes changed during the following period of study?

3. Has black participation in school-related organizations increased since the implementation of school desegregation?

4. Have local news media followed the process of integration and taken editorial stands on issues?

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3. R. Herriot and N. St. John, Social Class of the Urban School. New York: Wiley, 1966.

5. Has the city government made decisions and enacted laws in the climate of concern for human rights which initiated the decision to desegregate?

Activities of the study through May, 1969 have reflected concern for the allocation of resources (time and money) available to those undertakings which would produce the most valid answers to the questions which have been posed. Preliminary design, as outlined in the original proposal to the Rockefeller Foundation,[4] has been pursued through initial data collection and processing. Also, as a consequence of the experiences which have been acquired to date, the initial design has been modified. Specifically, the proposed study has been strengthened by the addition of one more year of testing to its data base; restrictions have been made in the range of data to be collected, and a more efficient schedule for data analysis has been developed. Some future modifications of design may arise in order to accommodate the available resources.

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4. Coffin, op. cit.

DESIGN AND PROCEDURES

The Quasi-experimental Design

In order to design a true experiment, it would be necessary to randomly assign pupils to experimental and control groups, desegregate the experimental subjects, and follow the progress of the two groups over the period of the study.

In real life, however, it is unthinkable to seek niceties of methodology to the extent of sacrificing the need for human dignity. The design of the Evanston study falls into the classification of the quasi-experimental.[5] This means that randomization will not usually have been achieved, but, whenever possible, 'before' and a series of 'after' measures of performance of various naturally occurring groups of pupils will be made to assess the impact of desegregation and the progress of integration.

Academic achievement and aptitude were measured during September, 1967, which was the beginning of desegregation, and again one year later during September 1968. These tests will again be administered to selected groups during September, 1969, and September, 1970. Pre-desegregation self-report attitude questionnaires were administered by Dr. Campbell of Northwestern University and repeated in the spring of 1968 and 1969. Other

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5. Donald T. Campbell and Julian C. Stanley, "Experimental and Quasi-Experimental Designs for Research on Teaching," Handbook of Research on Teaching. N. L. Gage, Editor. Chicago: Rand McNally and Company, 1963, pp. 171-246.

performance and observational measures of self-concept, attitude to school and cooperativeness in school are included in the design to determine whether professed attitudes are reflected by appropriate behaviors.

Some design features call for the collection of descriptive data by which to further classify pupils and thus increase design sensitivity. Evanston, unlike other suburban Chicago North Shore communities, is a city of considerable diversity in terms of socioeconomic levels, ethnic composition of residents, and neighborhood housing patterns. Until desegregation was implemented in 1967, some pupils attended segregated schools, whether all black or all white, while others were in schools of varying racial proportions. The design for the study calls for opportunistic exploitation of these naturally occuring groups in order to tease out the separate effects of prior school experience, busing, family background, and academic aptitude upon the achievement and attitudes of District 65 pupils. Advanced computer-assisted, statistical procedures can then subsequently be applied to most of the other data which will have been collected.

Fortunately, unlike many urban schools where student attrition is highly destructive to research plans, Evanston has been a relatively stable community. Cumulative school records are available for many pupils from kindergarten on. Thus, in addition to new data gathered specifically for the present study, there is a rich pool of historical information with which to add depth

to the profiles of the students.

Assessment of teachers and more especially parents' attitudes poses more serious problems of methodology and ethics. The answers to controversial questions gathered via paper and pencil tests cannot always be taken at face value. Many people, with justification, resent being considered guinea pigs and resist with vigor any invasion of their privacy. Consequently, it has been decided that as many unobtrusive measures of attitude, imaginatively described by Webb et al.,[6] will be used as possible. Simple and contrived observations[7] and public records are being sought to supplement any verbal information found via questionnaire or interview methods.

Pupil Population

The actual and projected enrollment of pupils in District 65 over the interval of the study are recorded in Table I (see p. 9).

Tests of academic skills were given on a district-wide basis in September, 1967, and September, 1968. These tests will be readministered according to the schedules summarized in Appendix A, Figures 1-4. At present, testings are projected only for grades 1, 3, 4, 6 and 7 in September, 1969; and grades 1, 3,

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6. Eugene J. Webb, Donald T. Campbell et al. Unobtrusive Measures: Nonreactive Research in the Social Sciences. Chicago: Rand McNally & Company, 1966, 185 pp.

7. Ibid.

Table I

Enrollments in Grades K-8 of Evanston District 65
from 1967-68 (Actual) through 1970-71 (Predicted)

Grade	1967-68	1968-69	1969-70	1970-71
K	1364	1439	1424	1407
1	1223	1259	1328	1314
2	1189	1185	1220	1287
3	1207	1183	1179	1214
4	1172	1203	1179	1175
5	1148	1164	1195	1171
6	1178	1158	1174	1206
7	1107	1207	1187	1203
8	1224	1111	1212	1192
Total	10,812	10,909	11,098	11,169

4, 7 and 8 in September, 1970.

Another design facet has called for random selection of one quarter of the white pupils and the entire black pupil population to be included in the sampling frame for a detailed study of the separate effects of prior school experience, busing, previous test results, family and neighborhood influences, and other non-academic variables.

Classrooms in which observations of teacher and pupil are to be made are selected on a random basis. Once classes are selected, repeated systematic observations are arranged to assess the reliability of observers and instruments.

An attitude questionnaire for pupils was administered to fifth graders in four schools before desegregation. It was repeated on a larger sample after one and two academic years of desegregation. A questionnaire for teachers was given to all teachers of the 1968 Summer Institute. It will be repeated on random samples of non-participant teachers during the next two years.

A randomly selected sample of fifth grade parents was interviewed in connection with a child-rearing practices study under the auspices of the Institute of Juvenile Research. These data will be made available for the present study.

Figures 1-4 are also schematic diagrams of the longitudinal design for those pupils, black as well as white, who had experienced de facto segregation prior to the implementation of

desegregation by busing. In addition to the pupils who were in segregated schools before 1967, other District 65 pupils experienced varying racial proportions in their schools. The pupils can be divided into the following groups according to their experience prior to as well as their treatment since fall, 1967:

1. Foster School pupils who are now being bused (N = 208).
2. Dewey School pupils who are now being bused (N = 145).
3. Foster School pupils who are not bused (N = 444).
4. Other black pupils who are not bused (N = 1,546).
5. White pupils whose schools were de facto segregated.
6. White pupils who attended integrated schools.

During the period of the study, new admissions, black and a proportion of the whites, will be studied as separate groups to determine the mutual impact of District 65 on newcomers.

Measures

A schematic presentation of the measures to be used to test the hypotheses of the study, the schedule of activities, and the subjects to be tested, is shown in Table II (see pp. 12-14). The measures were chosen on the basis of being appropriate to answer the questions posed as hypotheses.

Table II

A Schedule of Measures and Activities for Evanston Integration Study

Activity	Instrument	Subjects	A Measure of	Date	Progress
Grouping pupils into cells.		All pupils		April,1968.	Completed.
Statistics of racial composition of schools before 1967		All pupils	Per cent of pupils by race	Before Sept., 1967	Completed.
Academic testing program.	Caldwell Coop. STEP-SCAT	Kindergarten Grades 1-3 Grades 4-6, 7-8	Academic aptitude and achievement.	Sept.,1967, 1968, 1969, 1970.	On schedule.
Selection of sampling frame	Table of random numbers	All Negro pupils, $\frac{1}{4}$ of white pupils selected.		May,1968	Completed.
Coding and key-punching of pupil information through June 1968.		Sample	Grades, test results, personal information	June-Sept., 1968.	Completed
Future coding.		Sample	Grades.	1969, 1970.	To be scheduled.
Pupil attitude measures.	Campbell's questionnaire.	Fifth grades.	Self-concept and attitude to school.	May,1967, 1968, 1969.	Completed.
Training sessions for systematic observation.	PROSE* OScAR 5V#.	ETS personnel.	Teacher and pupil behavior.	Sept.,30, 1968.	Completed.

Continued

Table II Continued

Activity	Instrument	Subjects	A Measure of	Date	Progress
Simple pupil observation.	PROSE	Randomly chosen classrooms in each school.	Quantity and quality of student behavior	Winter, Spring, 1968-69 1969-70	'68-'69 completed. '69-'70 scheduled.
Contrived pupil observation.	RSSR+	Randomly chosen classrooms in each school.	Racial climate and ability to plan and carry out group project.	Fall and Winter, 1968, 1969.	'68-'69 completed. '69-'70 scheduled.
Teacher attitude measure.	Teacher's questionnaire	Summer Institute members.	Attitude to integration and pupils.	July, 1968, July, 1969	Completed. Scheduled.
Teacher observation.	OScAR 5V	Randomly selected teachers.	Teacher-pupil interactions.	1969-70	Scheduled.
Analysis of District 65 records.		All pupils	Attendance.	1967-70.	In progress.
		All pupils.	Disciplinary actions.	1967-70.	Scheduled.
Assessing SES of family.	Coleman's occupational classifications	Sample parents.	SES of pupil	Summer, 1968.	Completed.
Observation of PTA meetings.		All parents.	Participation by race in school connected activities.	1969-70.	To be scheduled.

Continued

Table II Continued

Activity	Instrument	Subjects	A Measure of	Date	Progress
Research on history of desegregation.	Evanston Review, Chicago papers, District 65 records, Library search		Community attitudes.	1970-1971.	In progress.
Report on racial composition of PTA Boards.	Questionnaire to PTA presidents.	All schools.	Racial distribution of PTA Boards.	1967-1971.	Completed through 1968.
Voting records by districts on school board issues.		Total district.	Community attitude to school.	1967-1970.	Available.
Minutes and action by City Council of Evanston.			Attitude to human rights.	1967-1970.	Available.

* Personal Record of School Experience
\# Observation Schedule and Record
\+ Russell Sage Social Relations Test

Systems Design and Maintenance

The data file maintained at ETS for the District 65 study should fulfill three requirements:

1. The data should be as complete as possible.
2. The data should be virtually error-free.
3. The data should be readily accessible.

Codings for the volume of information to be obtained through testing, observation, questionnaire and archives; and planning of appropriate sequential card layouts have been completed. Achievement and aptitude tests scores from Fall 1967 and 1968 have been transferred to tape; pupil record information has also been coded, punched and taped.

PERT networks were originally developed for most phases of the project. Those networks are expanded and updated as needed. Frequent cost analyses accompany applications of PERT to the study.

DATA ANALYSIS

Fundamental Technical Issues

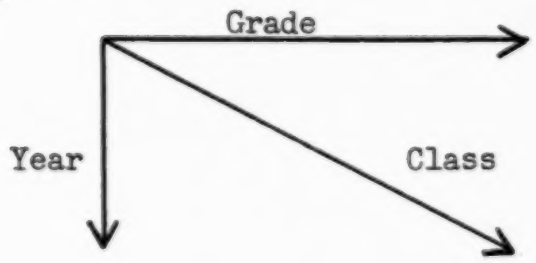
No single analysis of the data collected from a comprehensive longitudinal program, such as the Evanston integration study, would yield answers to all the questions being posed. This circumstance arises in part from the great volume of data which exist across the several areas of concern in the study. It also arises because of fundamental difficulties inherent to quasi-experimental designs of the type which constitute the major part of the study.

A difficult and fundamental problem exists when groups of students are classified as being in a certain grade in a certain year and as comprising a certain "class." The word "class" is used here in the sense that a class goes through the educational process together, as in the high school and college expression, "class of 1967."

The problem starts with the fact that for any given school system, the specification of all three of grade, year and class is redundant. One needs only two of these three to identify a set of test scores obtained by a group of students. This issue can be understood by considering grade (horizontal), year (vertical) and class (diagonal) vectors to be associated with an outline of a table in which to record test score data or summary statistics derived from that data. Such an outline could, for this study, take a form:

Year	Grade	
	4	5
1967-68		
1968-69		

Within the body of the table would then be recorded the grade, year and class vectors:



One can perform an analysis of variance with recorded test scores by classifying the data by levels of two of the factors, if it is safe to assume that there is no significant variation due to the third. For example, an analysis of variance could be performed with year and grade as classifications if students do not differ across classes, i.e., that the District 65 "class of 1972", who were fourth grade pupils in 1967-68 is no different from the classes of 1971 or 1973. Might it be similar in size and importance to differences in achievement outcomes to be expected from desegregation? Is a between class difference such as this of no importance?

The analysis of variance suggested in the preceding paragraph and the issues associated with its use both serve to illustrate a fundamental problem to be dealt with in data analysis, and to introduce the importance of providing for both cross-sectional and longitudinal analysis options. A second approach is to include only one level for one of the grade, year or class factors. But that common practice leaves the effects of the other two factors confounded and indistinguishable. That approach is taken in cross-sectional and longitudinal studies. Cross-sectional studies (done with a single year effect) typically attribute variations to grades and ignore class variation; longitudinal studies (following a single class) typically attribute variation to grades, ignoring variation due to years.

A third approach can be to compare the group being studied with some other (control) group for which one is willing to assume that one or two of the effects contribute negligible variation. The only potentially useful control groups which seem to be accessible are the groups tested to develop normative groups for academic skills measures. The resolution of what may be the most formidable issue in this study depends on assessment of variation due to year effect. If it may be assumed that the year effect in normative groups has been negligible, which may be possible for at least the SCAT-STEP tests, then that issue can be handled by scheduling a variety of cross-sectional and longitudinal analyses each of which has been selected for its pertinence to specific hypotheses and questions of concern in the study. All planning for data analysis has been undertaken under the belief that only by carefully attending to the complexities of the confounding of grade, year and class through the use of multiple analyses could a credible summation of desegregation outcomes be presented.

Future data collection, which must be planned with simultaneous concern for the technical issues which exist, has taken into consideration several additional priority relationships. Among them are:

1. The analyses planned and the relative importance of them.
2. The relative difficulty of testing at the various grade levels.

3. The desirability of having a variety of tests and grade levels.

4. The relative values of the information to be obtained, based on

   a. amount of information (how many scores of what discrimination quality)
   b. uniqueness of information vis-a-vis other studies of desegregation
   c. comparability of information with that of other studies.

The sections which follow in this chapter therefore outline the multiple modes of analysis which are projected for use with the data now scheduled for collection.

Preparation of Data for Analysis

The second district-wide testing of academic areas was completed on schedule. The data available so far include aptitude and achievement scores for all pupils in September, 1967 and again in September, 1968. In addition, during the summer of 1968, considerable personal information was amassed by the application of sampling frames to the files of pupil cumulative folders. These latter include coded data on grades in all subjects received prior to and since desegregation, birth place, mobility, parents' birth place, occupation and marital status, number of siblings, position in family and home language. A large volume of scores on standardized achievement and intelligence tests which had been accumulated by District 65 prior to 1967 was available for many subjects in the sampling frame and was coded for keypunch.

Prior to actual data analysis it is necessary to assemble it into packages which are as complete and accurate as possible. During the first year of the study data forms were frequently acquired which had many omissions and errors in them. The presence of these errors and omissions have necessitated considerable additional effort to correct and secure information which was essential to the conduct of a valid investigation. Almost all available data has been transferred to tape to ready it for subsequent analyses.

Analyses Through April, 1969

Distribution analysis programs have been written for this study. They were written to provide frequency distributions and key statistics on groups of students with the same sex, race, grade and school for a given test in a given year. It also provides the same data aggregated across sex, race and both sex and race. Then, it provides the same data aggregated across schools for a view of the entire school district. It is tabulated in such a way as to make visual inspection and comparison of groups particularly easy. Skewed, bimodal and flat-topped distributions and outliers are made apparent.

The processing of academic skills data has been initiated through use of the programs which were written. Outputs of those analyses have been submitted to visual inspection; a variety of tables and figures have been prepared from the output. Distribution analyses are continuing at the time of this writing,as is the study of the contents of computer output sheets.

Projected Analyses

Distribution analyses are projected to be run soon after September, 1969 and September, 1970 testings. Outputs will be directly comparable to those for the two preceding testings.

In addition to the information gained from the distributive analyses, more knowledge about the following aspects of pupil performance will be sought:

1. Information about gains made by individual pupils over time,

2. Comparisons of groups of pupils in terms of sex, race, grade, years of prior segregated schooling and the like, and

3. Some assessment of the actual differences between schools in terms of educational performance when input variables are controlled.

The major categories of pupil data will be available which include (1) cross-sectional comparison data, (2) matched longitudinal data having individual student scores as units. (3) matched longitudinal data having school means for pupil groups as units, (4) mobility data for estimating characteristics of pupils entering and leaving District 65, and (5) cumulative record data including grades earned, SES information and teacher comments on attitude and study habits.

In a study such as this, it is tempting to consider exhaustive analyses of each package of data (for example, that of each year)

as it becomes available. However, with the exception of distribution analyses, such efforts will be avoided in order to conserve financial and personnel resources. Strong preference is being given for more inclusive and comprehensive forms of analysis whenever possible.

To facilitate internal and external communications with regard to analysis, hypotheses have been formulated, to which modes of analysis may be directly related. These hypotheses can, in turn, be related to the questions phrased in the earlier chapters on background and design. By referring back to Appendix A while studying the hypotheses and accompanying comments about analysis, the reader may acquire an understanding of the sources of data which will be called for in each analysis, the pertinence of the hypotheses to technical design considerations, testing schedules, and other issues.

Some hypotheses call for the use of <u>cross-sectional data</u>. They are H_o's 1, 2 and 3 which, in accompaniment with remarks about their analysis, follow.

H_o1: Among pupils who entered District 65 as Kindergartners in '67 and '68 and first graders during Fall '67, '68 and '69; there were no differences in test performance when they were grouped according to race and sex.

Analyses: Analysis of variance of Caldwell scores or STEP Listening, or P statistic.

H_o2: There were no differences among groups in test performance over three years for third, fourth and seventh graders.

Analyses: ANOVA of Coop Scores (Grades 3, 4 and 7) and STEP-SCAT scores: grades (2) by race (2) by sex (2) by segregated schooling (2). Other options include t or p-statistics and multiple discriminant functions.

H_o3: There were no differences among groups classified by race, sex and prior segregation in terms of mean gains over three years when cross-sectional gain in scores from grades 4 to grades 7 were analyzed. Some sort of standard unit such as mean gain /SD or gain/ standard error of measurement could be used for comparison purposes.

Analyses: P statistic, univariate ANOVA of groups and discriminant function analyses are options. Also, the residual gain - i.e., that portion of the grade scores for each group which is not correlated with 4th grade performance.

Five hypotheses are to be considered which call for <u>longitudinal</u> <u>data</u> analysis.

H_o4: There were no differences in gain '67-'68 and '68-'69 of Caldwell Preschool and STEP

Listening among groups of kindergarteners who entered District 65 in Fall, 1967, when initial ability was accounted for.

Analyses: ANOVA of residual gains when either Caldwell scores or Caldwell plus SES are used as covariates, or multiple regression analyses using Caldwell, father's occupation and home address as well as race as independent variables and gain as dependent variables.

H_o5: For the same pupils, the gain in STEP scores other than Listening in grades 2 to 3 during '68-'69 were not different among groups. Caldwell scores may be used as covariates.

H_o6: There were no differences in gains over years of STEP-SCAT scores among groups of Fall, 1967, fourth graders when initial ability was accounted for.

Analyses: ANOVA of residual gains or discriminant function.

H_o7: Same as above, but for fifth graders.

Hypotheses may also be specified which call for analysis of data between schools.

H_o8: Other things being equal, there were no differences among schools in pupil gains between grades 1 and 3 among groups.

Analyses: Predicting third grade scores solely from first grade scores, to obtain an expected output and then correlating school with residual, or discriminant function. If within school slopes are examined, of output on input measures, the relative effectiveness for superior and inferior students might be inferred.

H_o9: Same as above, but for grades 4-6 gains.

H_o10: Same as above, but for grades 6-8 gains within junior high schools.

Finally, analyses may also be related to specific hypotheses requiring <u>other data</u>. Three such hypotheses are most important.

H_o11: For fourth graders in 1967, their school grades earned had no systematic relationship to achievement or aptitude test scores.

Analyses: Multiple correlation or canonical correlation.

H_o12: Pupil's SES as well as race contribute significant variance to grades earned in addition to that of ability.

Analyses: Multiple regression, analysis of covariance or multiple discriminant functions.

H_o13: Teacher's perception of pupil behavior has no relationship to grades, test scores, race or SES of pupils.

Analyses: Discriminant functions, multiple regression or ANOVA.

Statistical References

One of the statistical procedures which was referred to in the preceding section has not, as have the others, been used extensively. It may have, however, some advantages which support its use at this time. The p-measure is a measure of the difference between two probability distributions. If one takes two sets of numbers (scores), $(x_1, x_2, \ldots x_m)$ and $(y_1, y_2, \ldots y_n)$, then the probability that a randomly selected x is larger than a randomly selected y is the p-measure of the x_i's with respect to the y_j's. P is the Wilcoxen-Mann Whitney statistic, divided by the product of the sample sizes, mn.

One of the early discussions of p was by Birnbaum[8] in 1956. The power-efficiency of the Mann Whitney test is about 95% of that of the t-test when used in lieu of the t-test. But, with the p-measure, one has the advantage that the assumptions of normality and equal variances are not needed.

Analysis of variance and other statistical procedures which have been referred to are described in a wide variety of

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8. Z. W. Birnbaum, "On a Use of the Mann-Whitney Statistic", Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability, Vol. 1 (University of California Press, 1956), pp. 13-17.

sources among which are Winer,[9] Tatsuoka and Tiedman,[10] and Rao.[11] Applications of those methods which have relevance to this study have been discussed by Dyer and Linn[12], Manning and Dubois,[13] Shaycroft,[14] and Werts and Linn[15].

More than one statistical procedure is being planned for each hypothesis to reduce equivocal results in final output.

Between the current date and time when final analyses must be run it is likely that additional options for analysis will arise. Budgetary restrictions will influence the selection of final combinations of analyses to be undertaken.

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9. B. J. Winer, Statistical Principles in Experimental Design. New York: McGraw-Hill Book Company, 1962, 672 pp.

10. Maurice M. Tatsuoka and David V. Tiedeman, "Statistics as an Aspect of Scientific Method in Research on Teaching," Handbook of Research on Teaching. N. L. Gage, Ed., Chicago: Rand McNally and Company, 1963, pp. 142-170.

11. C. R. Rao, Advanced Statistical Methods in Biometric Research, Wiley, 1962.

12. Dyer and Linn, "Methods of Measuring School System Performance", RB-68-55.

13. Manning and Dubois, "Gains in Proficiency as a Criterion in Test Validation", Journal of Applied Psychology, 42, 1958, pp. 191-194.

14. Shaycroft, Marian, "The High School Years - Growth in Cognitive Skills", AIR, 1967.

15. Werts and Linn, "Analyzing School Effects", RB-68-60.

REPORTING AND DISSEMINATION

The flow of academic skills data generated by the Evanston Integration Study permits the ETS project staff to prepare statistical summaries containing purely descriptive information as it becomes available. Distribution analyses have been scheduled for that purpose with outputs suitable to plotting and reporting in a variety of formats. A copy of each validated distribution analysis output will be transmitted to District 65 as it becomes available. ETS personnel will review outputs of the distribution analysis program, and prepare summaries of their contents for internal project-associated scrutiny, as well as for transmission to District 65. Additional transmissions will be made during the Summer of 1969, after Fall, 1969, and Fall, 1970 testings.

Final multivariate analyses will be scheduled for Fall and Winter of 1970-71. Outputs of these more complex analyses will also be studied, summarized and transmitted to District 65 as they become available, with a final summary document scheduled for preparation during Spring, 1971.

It is doubtful that any appreciable dissemination efforts should be made prior to the conclusion of the study in June, 1971. Certainly, no evidence that the academic performance of white students has been harmed or that the academic performance of black children has been appreciably improved as a result of

desegregation has come to the attention of project staff at this time. But this does not mean that the possibility of such outcomes, however unlikely, may not later be entertained, when data has been more comprehensively studied. Therefore, a full scale summary for transmission to District 65, which holds responsibility for dissemination, will not be available until June, 1971. Earlier brief, qualified, descriptive summaries can then be augmented and corrected by a general press release.

BUDGET AND EXPENDITURES

March 18, 1968 through May 31, 1969

Expenditures through May 31, 1969 and projected expenditures for later intervals of the study are recorded in Table III on the following page. The actual expenditures to date are a considerable proportion of the total ETS budget of $107,000.00 because they cover more than half of all projected costs for testing of academic skills and the very heavy financial burdens associated with initiating the data storage and analysis procedures. Data cards have been converted to tape, schedules for later data collection developed, and technical questions of design have been studied. A reduction can be noted over the remainder of 1969 and the first half of 1970; expenditures for analysis and report writing will contribute to increased costs over the final fiscal year.

Table III

Actual and Estimated Costs for ETS Subcontract to District 65

Category	Actual	Estimated			
	3/68-5/69	6/69-12/69	1/70-6/70	7/70-12/70	1/71-6/71
ETS Staff	$29,910.26	$ 2,160.00	$ 2,790.00	$ 5,050.00	$ 8,230.00
Data Processing	5,095.70	6,300.00	1,000.00	3,800.00	4,800.00
Travel	1,240.51	400.00	200.00	400.00	1,000.00
Materials, Supplies and Miscellaneous Services:					
Testing Materials	3,755.47	500.00	100.00	500.00	500.00
Postage	182.29	50.00	20.00	35.00	50.00
Telephone	203.51	60.00	30.00	80.00	100.00
Misc. Supplies & Services	424.18	300.00	200.00	300.00	700.00
Building and Equipment	3,117.01	1,200.00	900.00	900.00	1,000.00
Indirect Costs	9,829.14	2,194.00	1,048.00	2,213.00	3,276.00
Total	$53,758.07	$13,164.00	$6,288.00	$13,278.00	$19,656.00

Total $106,144.00

APPENDIX A

District 65 Aptitude and Achievement Testing Schedules

Figure 1

Caldwell Preschool Inventory

District 65 Aptitude and Achievement Testing Schedule*

Time	Pupil Grade K	1	2	3	4	5	6	7	8
Sept. 1967	X_0	X_0	X_1	X_2	X_3	X_4	X_5	X_6	X_6
Sept. 1968	X_0	X_0	X_0	X_1	X_2	X_3	X_4	X_5	X_6
Sept. 1969		X_0		X_0	X_1		X_3	X_4	
Sept. 1970		X_0		X_0	X_0			X_3	X_4

* Subscripts denote years of segregated schooling

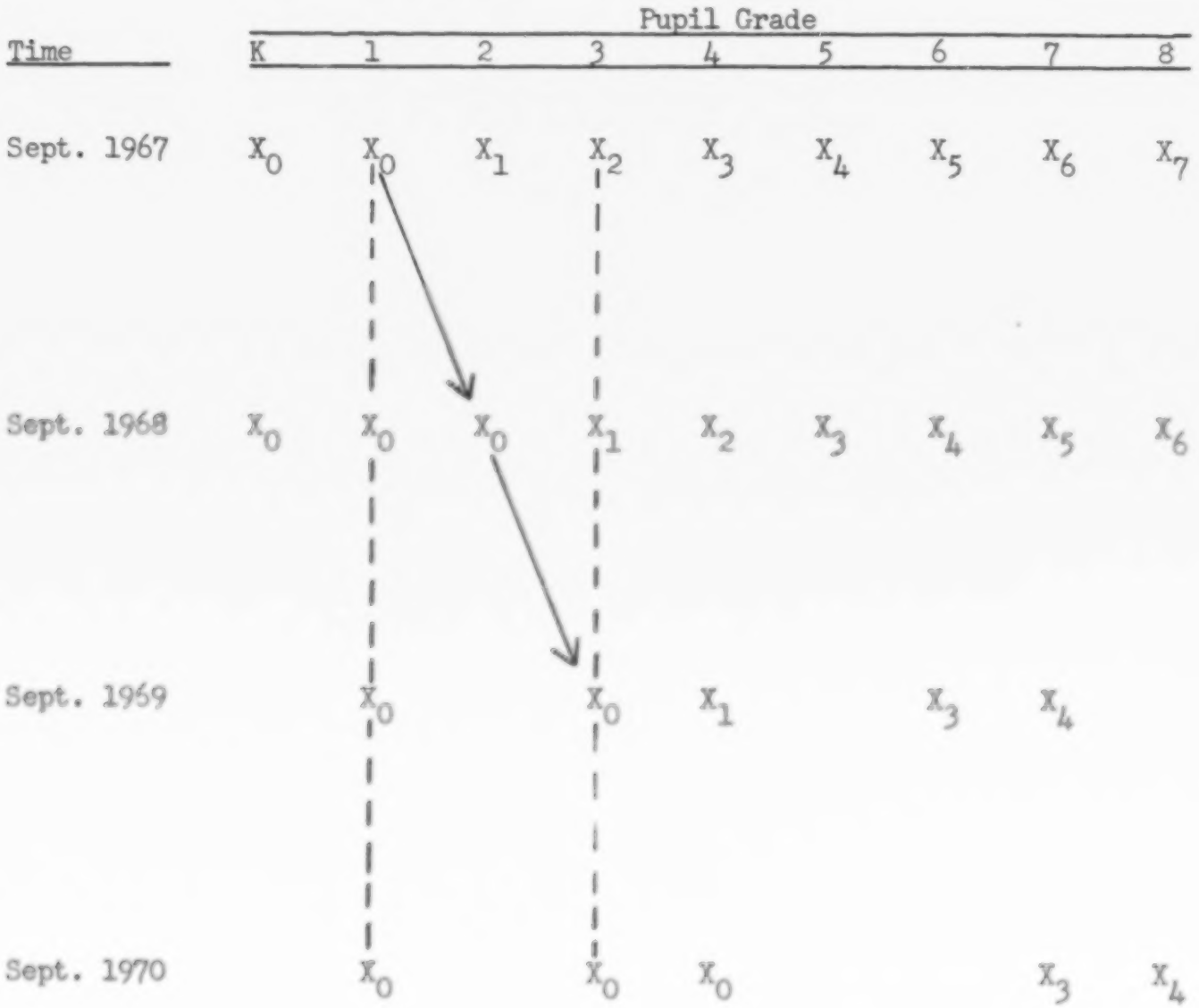
→ Matched Longitudinal Gains Analysis.

- - - Cross-sectional Comparisons.

Figure 2

Cooperative Listening Test

District 65 Aptitude and Achievement Testing Schedule*


Time
Pupil Grade
K 1 2 3 4 5 6 7 8
Sept. 1967 X_0 X_0 X_1 X_2 X_3 X_4 X_5 X_6 X_7
Sept. 1968 X_0 X_0 X_0 X_1 X_2 X_3 X_4 X_5 X_6
Sept. 1969 X_0 X_0 X_1 X_3 X_4
Sept. 1970 X_0 X_0 X_0 X_3 X_4

* Subscripts denote years of segregated schooling.

⟶ Matched Longitudinal Gains Analysis.

- - - Cross-sectional Comparisons.

Figure 3

Cooperative Reading, Word Analysis, Writing and Mathematics

District 65 Aptitude and Achievement Testing Schedule*

Time	Pupil Grade K	1	2	3	4	5	6	7	8
Sept. 1967	X_0	X_0	X_1	X_2	X_3	X_4	X_5	X_6	X_6
Sept. 1968	X_0	X_0	X_0	X_1	X_2	X_3	X_4	X_5	X_6
Sept. 1969		X_0		X_0	X_1		X_3	X_4	
Sept. 1970		X_0		X_0	X_0			X_3	X_4

* Subscripts denote years of segregared schooling.

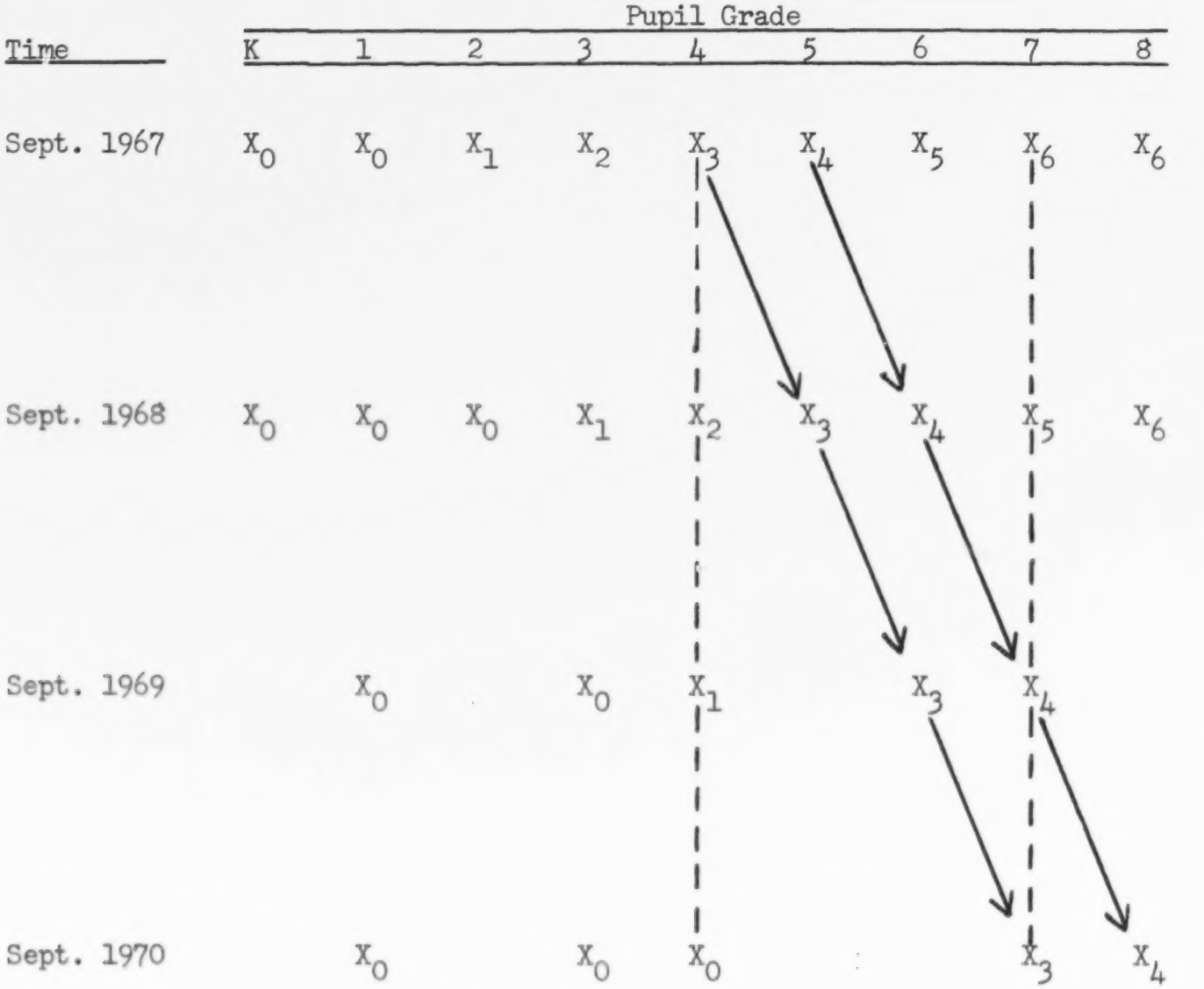
⟶ Matched Longitudinal Gains Analysis.

- - - Cross-sectional Comparisons.

Figure 4

SCAT STEP

District 65 Aptitude and Achievement Testing Schedule*


Time
Pupil Grade
K 1 2 3 4 5 6 7 8
Sept. 1967 X_0 X_0 X_1 X_2 X_3 X_4 X_5 X_6 X_6
Sept. 1968 X_0 X_0 X_0 X_1 X_2 X_3 X_4 X_5 X_6
Sept. 1969 X_0 X_0 X_1 X_3 X_4
Sept. 1970 X_0 X_0 X_0 X_3 X_4

* Subscripts denote years of segregated schooling.

⟶ Matched Longitudinal Gains Analysis.

- - - Cross-sectional Comparisons.